

PAPERS.

19. Some New Siphonaptera from China. By KARL JORDAN, Ph.D., F.E.S., and the Hon. N. CHARLES ROTHSCHILD, M.A., F.Z.S., F.E.S.

[Received and Read March 7, 1911.]

(Text-figs. 104-124.)

The following fleas were collected by Mr. M. P. Anderson in the provinces of Shensi, Kansu, and Sze-chuen, China. The collection contains altogether 17 species, of which no fewer than 13 are new. Some of these are closely related to species described from Turkestan or European Russia, and may possibly be only geographical developments, others represent very distinct types not very nearly allied to anything known from other countries.

1. *ARCHLEOPSYLLA SINENSIS*, sp. n. (Text-figs. 104, 105.)

♂ ♀. Agrees in both sexes very closely with *A. erinacei* Bouché (1833) from Europe, differing chiefly in the following points:—

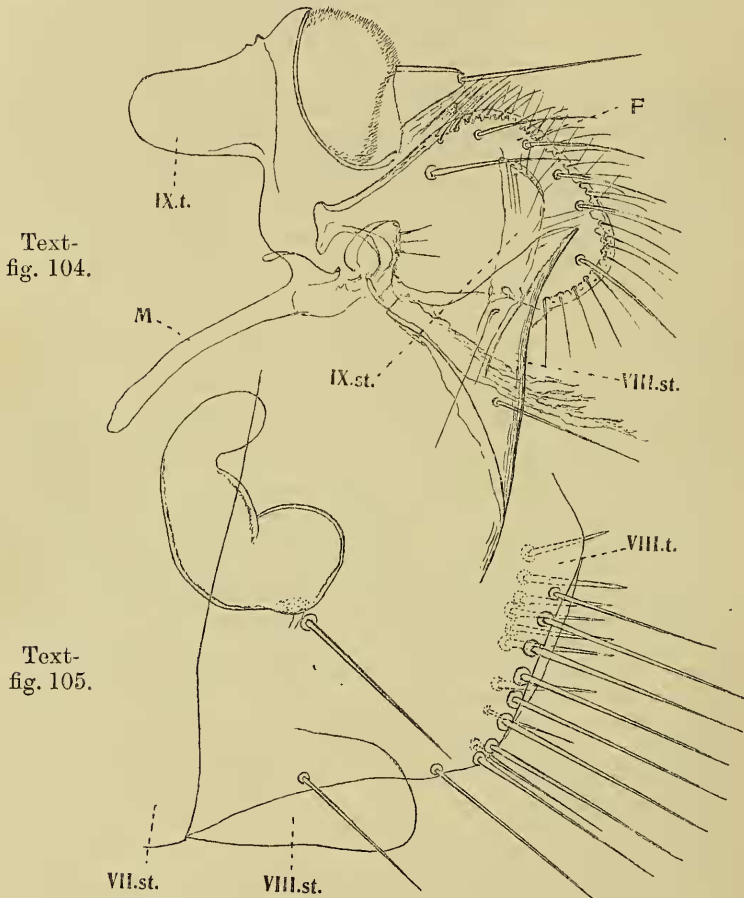
The tooth situated in *A. erinacei* at the apex of the genal lobe of the head below the antennal groove is either absent from *sinensis* or small and very pale. The receptaculum seminis of the female (text-fig. 105) is slightly smaller than in *erinacei*, and the modified abdominal segments of the male exhibit some easily recognisable characteristics as follows:—The ninth tergite, which in *erinacei* has a short, broad, and curved manubrium, bears a broad and straight manubrium with rounded apex (text-fig. 105, IX. t.). The ventral margin of the eighth sternite is not denticulate. The large movable process (P) of the clasper is much shorter than in *erinacei*, and its ventral edge, instead of being continued downwards as a broad thin flap which is slit at the margin into filaments, bears only a narrow membranaceous appendage. The ninth sternite (IX. st.) is less rounded at the apex than in *erinacei* and has more bristles. As this sternite is partly concealed in our specimens by other organs, we are not quite certain that our figure gives the exact outline of it.

A small series of both sexes from Yu-lin-fu, Shensi, 4000 ft., taken off *Erinaceus miodon*.

2. *CERATOPHYLLUS CRISPUS*, sp. n. (Text-figs. 106-108.)

♂ ♀. The male of this species shows some very remarkable specializations not observed in any other known flea, the second segment of the antenna bearing in that sex some very long and strong bristles which extend far beyond the long club, and the posterior margin of the hind coxa being incurved at some distance from the base. Moreover, the hind tarsus of the male exhibits a development of the bristles which is only approached to some extent in the males of two species of the genus *Vermipsylla*. The female of *C. crispus*

does not exhibit any trace of these specializations. The bristles of the second antennal segment of the female are all short, and the hind coxa and tarsus are quite normal. It agrees, however, with the male in other characteristics—for instance, the long rostrum and relatively short maxillary palpus, the absence of a row



Text-fig. 104.—Clasping organs of *Archaeopsylla sinensis* ♂.

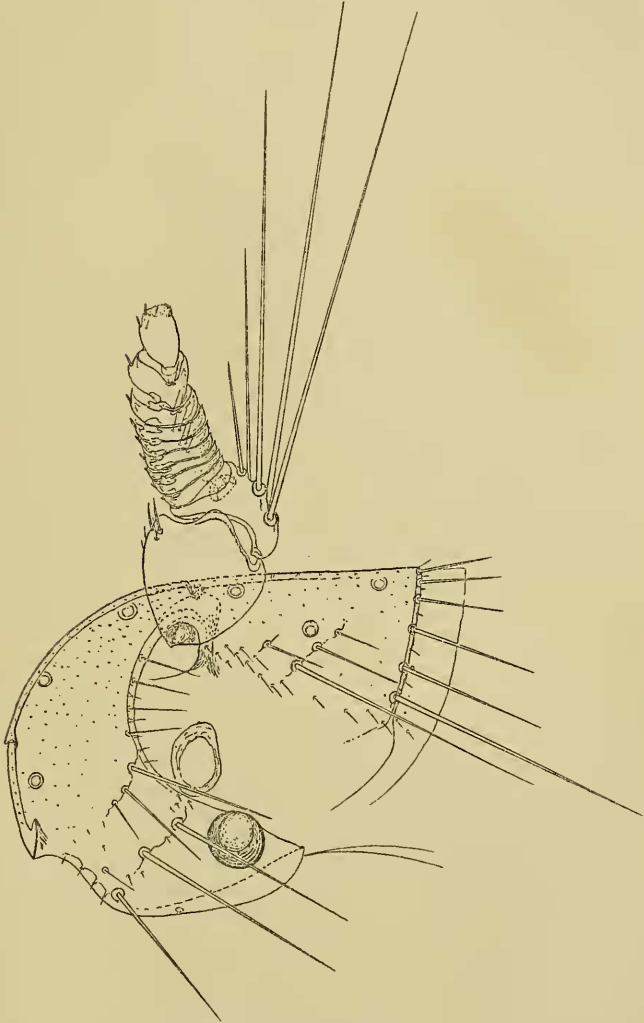
Text-fig. 105.—Abdominal segments VII & VIII and receptaculum seminis of *Archaeopsylla sinensis* ♀.

of bristles on the inner surface of the mid and hind femora, the presence of two rows of lateral bristles on the hind tibia, the relatively short first mid-tarsal segment, &c.

We may mention incidentally, in connection with the drawing

of the head (text-fig. 106), that the antenna moves on a pivot standing almost at right angles to the first segment. For that reason the antenna cannot assume a position at right angles to

Text-fig. 106.

Head of *Ceratophyllus crispus* ♂.

the lateral surface of the head, but, when moved from the antennal groove, slides along the side of the occiput until the

position is reached which it has in our drawing. The hind side, which bears the long bristles, is nearest to the eye when the antenna is in the groove, and it is always the outer surface which is presented.

Head.—The rostrum is a little longer in the ♀ than in the ♂. It reaches beyond the trochanter in both sexes, the apex of the fourth segment being on a level with the base of the trochanter and the last segment being more than twice the length of the fourth. The maxillary palpus extends to the third segment of the rostrum. The bristles of the head are almost the same in number in the sexes (*cf.* text-fig. 106), but are less strongly developed in the ♀ than in the ♂; moreover, the thin bristles at the anterior edge of the antennal groove are not present in the ♀, and of the four bristles placed in the ♂ above the antennal groove (1, 3) the anterior one is absent, and the large ventral one of the row of 3 is accompanied by but one bristle, which is small. The first antennal segment of the ♂ bears on the inner surface a number of small bristles along the anterior edge, and the outer surface of this segment of the ♀ has numerous small hairs. The second antennal segment of the ♀ bears one row of short hairs, these hairs being very thin and only reaching to the second segment of the club. In the ♂ this segment has several very long bristles, as shown in the figure.

Thorax.—The pronotal comb consists of 18 to 20 spines. The meso- and metanotum bear each two rows of bristles and a number of additional short bristles which represent three more rows on the mesonotum and two on the metanotum, being less numerous on the latter than on the former. The mesonotum has on the inner side eight slender spines on the two sides together. The mesopleura bear 9 to 11 bristles, the metepisternum 3 and the metepimerum 7 or 8 (3, 3 or 4, 1). There are 2 or 3 apical spines on the metanotum on the two sides together.

Abdomen.—The four to six anterior tergites bear apical spines, the numbers being (on the two sides together) in the ♂ 2—3 or 4—2—2—2—0 or 2, and in the ♀ 2 or 3—2 to 4—2—2. The apical edge of segments I to VII is distinctly denticulate in both sexes. There are two rows of bristles on the tergites. The stigmata are placed above the first bristle of the second row, and below the first of the anterior row. The ♂ has one very long antepygial bristle accompanied by two short but strong ones, the upper one being the shortest. The ♀ also has three antepygial bristles, of which the upper one is half and the lower one two-thirds the length of the central bristle, which is as long as the first hind-tarsal segment. The first sternite has (on both sides together) two bristles, sternites III to VII bearing in the ♂ 6 bristles, and III to VI in the ♀ 6 to 8, while VII has 10 to 12 in the ♀, with one or two small bristles in front of this row, there being no additional bristles or quite exceptionally one bristle on the other sternites.

Legs.—The hind margin of the hind coxa of the ♂ is incurved from one-fourth of the margin to its centre. The mid- and hind femora bear on the inside one lateral bristle, placed at the basal third, and on both sides one subapical ventral bristle. The hind tibia has a double row of 13 to 16 bristles on the outer surface and a single row of 5 to 7 on the inside. The outer dorsal bristles, 18 in number inclusive of the apical one, are stout, most of them being less pointed than usually and nearly all being of more or less the same length. The longer bristles have likewise blunt tips. The longest apical one hardly reaches to the sub-apical notch of the first hind-tarsal segment. The first segment of the mid-tarsus is distinctly shorter than the second. The fourth segment of the fore- and mid-tarsi is only as long as it is broad, that segment of the hind tarsus being one-tenth longer than broad in the ♀ and about one-fifth in the ♂. The fifth segment bears in all the tarsi five pairs of lateral bristles. The hind tarsus of the ♂ is remarkable for the peculiar development of the bristles. The bristles on the upper surface and at the hind edge of these segments are thin and those placed in the notches of the hind edge and at the apex are long, the longest bristles, moreover, being wavy. There are eight bristles each dorsally at the apex of the second and third segments. These bristles radiate in fan-shape, the one placed at the anterior apical corner deviating but little from the general direction of the tarsus and being the shortest of the row, the others gradually increasing in length as one proceeds from the anterior to the posterior side of the segment, the longest about equalling segments 3, 4, and 5 together. The bristles on the tarsi of the ♀ are all short, the apical ones of the second hind-tarsal segment not reaching even to the apex of the third segment. The proportional lengths of the segments are as follows:—

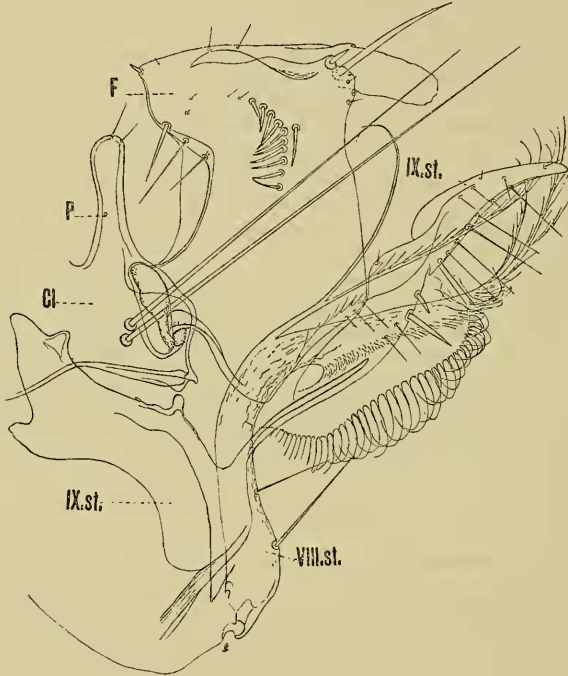
Mid tarsus: ♂. 18, 20, 11, 7, 19; ♀. 17, 20, 11, 7, 19.

Hind tarsus: ♂. 50, 39, 14, 9, 21; ♀. 47, 38, 16, 10, 22.

Modified segments.—♂. The eighth tergite bears about 20 bristles in the upper half of the apical lobe and none in the lower half. The eighth sternite (text-fig. 107, VIII. st.) is narrow and curved, and bears ventrally two bristles. Its distal portion is membranaceous and divided into a large fringed flap and several long filaments as indicated in the figure. The clasper (text-fig. 107, Cl) is small and is produced into a vertical, slightly club-shaped process (P), which bears two small hairs. The movable process (F), on the other hand, is very large and presents two remarkable structures. The upper edge, is, as far as we can make out, widened into a membranous appendage which projects distally and does not bear any hairs. The other peculiarity is the presence of a row of short spine-like bristles on the outer surface of the "finger." The ninth sternite (text-fig. 107, IX. st.) has a broad, curved vertical arm and a long and relatively narrow horizontal arm, both being of a characteristic shape. The distal portion of the horizontal arm narrows almost to a point.—

♀. The apical margin of the seventh sternite is slanting and more or less undulating, the two sides not being exactly alike. The ventral angle of this sternite projects more or less strongly and is sometimes almost pointed (text-fig. 108, VII. st.). The eighth tergite (VIII. t.) bears on each side only 4 to 7 small bristles above the stigma, and below it one long one accompanied by one to four small ones. There are 12 bristles on the lower half of the segment as shown in the drawing (text-fig. 108). The apical margin is angulate below the centre and the upper angle more or

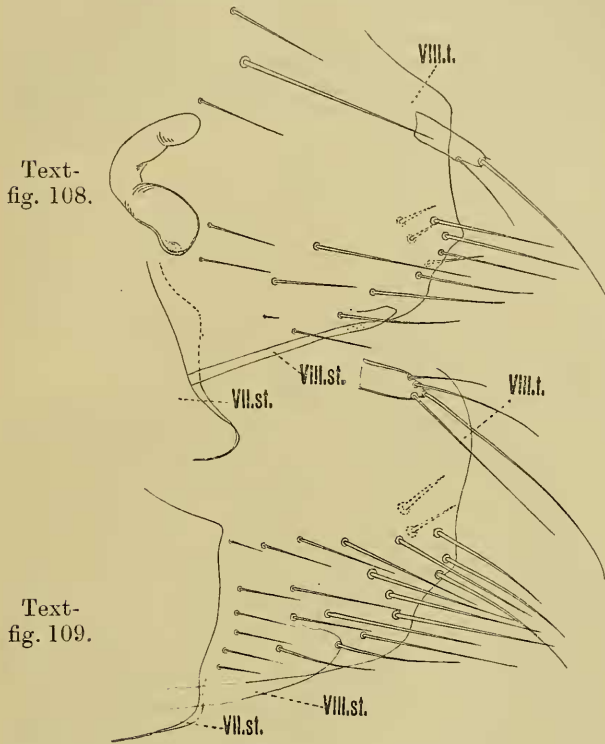
Text-fig. 107.

Clasping organs of *Ceratophyllus crispus* ♂.

less rounded off. The ninth sternite—more or less membranaceous and lying inside the eight tergite—bears some small hairs. The stylet is almost cylindrical and bears one bristle beside the apical one. The anal sternite has 4 very long bristles at and near the apex and proximally to them, on the underside, about 6 heavy spine-like bristles, besides a number of short lateral and ventral bristles, of which some are thin and others stout. The receptaculum seminis (text-fig. 108) is slender, the head being shorter than the tail.

Length (mounted specimens) 2·4 to 2·8 mm.

Two males and four females from Omi-shan, Sze-chuen, 6000 ft., off *Sciurotamias davidianus consobrinus* M.-Edw., and from 23 miles S.E. of Ta-t sien-lu, 7500 ft., off the same host.



Text-fig. 108.—Abdominal segments VII & VIII, stylet and receptaculum seminis of *Ceratophyllus crispus* ♀.

Text-fig. 109.—Abdominal segments VII & VIII and stylet of *Ceratophyllus dolabris* ♀.

3. CERATOPHYLLUS DOLABRIS, sp. n. (Text-figs. 109, 110.)

♂ ♀. Nearly allied to *C. lagomys* Wagn. (1897), of which only the ♀ is known to us. The new species is distinguished from that sex of *lagomys* by the shorter bristles of the eighth abdominal sternite, the differently shaped non-movable process of the clasper, the much narrower distal portion of the ninth sternite, the broader lobes of the anal sternite, and some other details mentioned below. The most characteristic feature in both *lagomys* and the new species is the development of the tenth abdominal sternite of the ♂. This sternite consists in fleas normally of a

single sclerite. In the males of the species under discussion, however, it is completely separated in the mesial line into a right and left lobe, which are very long and slender, projecting far beyond the tenth tergite, and bearing numerous bristles on the upper and lateral surfaces but none on the underside.

Head.—The frontal tubercle is prominent. There is a row of 3 long bristles in front of the eye. The occiput bears one long bristle above the antennal groove, besides the subapical row of bristles. The bristles on the second segment of the antenna of the ♀ are long, there being at least five which reach beyond the club. The rostrum extends to the base of the femur and the maxillary palpi reach the trochanter.

Thorax.—The comb of the prothorax consists of 17 or 18 spines, there being usually an additional small spine on each side. The meso- and metanotum have on the two sides together a posterior row of 12 bristles, and before it a row of about 6, the mesonotum bearing in addition a row of hairs at the base and several short bristles on the back. The metanotum has four apical spines on the two sides together. There are from 4 to 6 bristles on the metepimerum (1 or 2, 2 or 3, 1), usually 4 or 5.

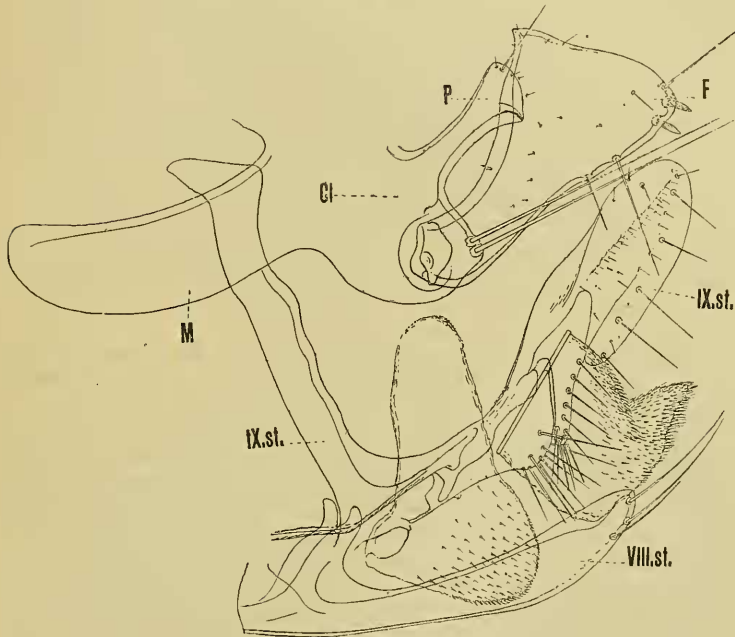
Abdomen.—The tergites bear each two rows of bristles, the first tergite having 2 or 3 additional bristles in front of the rows. On none of the tergites does the anterior row extend down to the most ventral bristle of the posterior row, the row stopping short at the third or fourth bristle of the posterior row on the central segments in the ♂, and at the second or third in the ♀. Tergites I to IV or V bear apical spines like the metanotum, the numbers being on the two sides together, 4—4 to 6—4—2 to 4—0 to 2. The ♂ bears one long antepygidial bristle accompanied by two minute hairs, while the ♀ has 3 bristles (all broken on both sides in our only ♀). The bristles on the sternites number on the two sides together in the ♂ 2, 6, 7, 8, 8, 8, and in the ♀ 5, 9, 11, 11, 11, 15, there being 16 additional bristles on the seventh sternite of the ♀, which are placed irregularly in front of the row. The stigmata in the ♀ are placed a little above the first bristle of the posterior row of the tergites or on level with it, in the ♂ below it on the posterior segment.

Legs.—The hind femur bears on the outer side one subapical ventral bristle and in the anterior half one or three lateral ones. On the inner surface there is a row of 9 to 12 bristles. The hind tibia has outside a row of 8 or 9 lateral bristles and on the inside a row of 4 to 7. The longest apical bristle of the second hind-tarsal segment reaches beyond the apex of the third. The fourth hind-tarsal segment is nearly twice as long as it is broad near the apex.

Modified segments.—♂. The eighth tergite has 3 bristles below the stigma, a row of 6 to 8 at the upper edge of the apical lobe, with 1 or 2 bristles close to the row, and an oblique and more or less irregular row of 5 or 6 near the ventral edge. The eighth sternite (text-fig. 110, VIII. st.) is similar to that of *C. lagomys*.

It bears, as in that species, three bristles at the apex on each side. While the two longest of these bristles are, however, half the length of the sternite in *lagomys*, they measure only about one-third the length of the sternite in the new species. The clasper is much the same as in *C. lagomys*, but the process (P) (text-fig. 110) is much more incurved on its distal side and hence the lower corner of the widened apical portion more pointed. The upper edge of the triangular movable process (F) (text-fig. 110) is less rounded than in *lagomys*, the two spines are pointed, and the long bristle of the distal edge is placed farther away from

Text-fig. 110.

Clasping organs of *Ceratophyllus dolabris* ♂.

them than in *lagomys*. The ninth sternite (text-fig. 110, IX. st.) is characterised, as in *C. lagomys*, by the central ventral lobe of the horizontal arm bearing a number of rather strong, short bristles at the apex. The thin, pale, distal lobe is more rounded than in *lagomys* and much broader.—♀. The seventh sternite (text-fig. 109, VII. st.) is truncate and slightly incurved twice. The eighth tergite (VIII. t.) bears 5 to 6 bristles below the stigma in two rows and has the upper angle of the apical lobe strongly rounded, the centre of the apical margin being somewhat triangularly produced as shown in the figure. The bristles of the

stylet are long, the one placed near the ventral edge (side-view) being exceptionally long.

Length (mounted specimens) 2.5 to 3.2 mm.

Three males and one female from Old Tau-chow, Kansu, 9000 ft., off *Marmota robusta* M.-Edw.

4. CERATOPHYLLUS CRASSUS, sp. n. (Text-fig. 111.)

The only specimens (two females) which we have were in the same tube as the specimens of *C. dolabris*, being found on the same host, presumably on the same individual of the host. They resemble the female of *C. dolabris*, but are much more hairy and of stronger build.

Head.—The frons bears a row of three bristles before the eye, the upper two standing rather close together and there being a fourth bristle in front of the ventral one of the row. The occiput bears a moderately long bristle above the antennal groove, about 10 small hairs along the groove, one of them being longer and thicker, and the usual subapical row. The two lower bristles of this row are large and there is a wide interspace between them and the next bristle of the row. The bristles of the second antennal segment are long, at least five of them reaching the apex of the club. The frontal tubercle is prominent. The maxillary palpus extends to near the apex of the fore coxa, while the rostrum reaches far beyond the trochanter, the apex of the fourth segment being on a level with the base of the trochanter.

Thorax.—The pronotal comb consists of 20 to 23 spines. The meso- and metanotum bear each two rows of bristles. The bristle-like spines on the inner surface of the mesonotum are very numerous (14 to 16 on the two sides together).

Abdomen.—The tergites bear three rows of bristles, the anterior row being more or less irregular, the second reaching down to the stigma and the third row having 2 or 3 bristles placed below the stigma. The tergites I to IV or V bear apical spines like the metanotum, the numbers on the two sides together being 4—5 to 7—4 to 6—2 to 5—0 or 1. The edges of the tergites are irregularly excised dorsally, but do not show any distinct minute serration as is usually the case in the allied forms. There are three antepygial bristles (broken in our two specimens). All the sternites have additional bristles in front of the usual posterior row, the numbers of bristles being as follows on the two sides together (the first number referring to the additional bristles of each segment): 5 or 6, 6 to 8—19 to 21, 16 or 17—22 to 24, 15 to 17—22 to 26, 14 to 16—22, 15—18 to 22, 19.

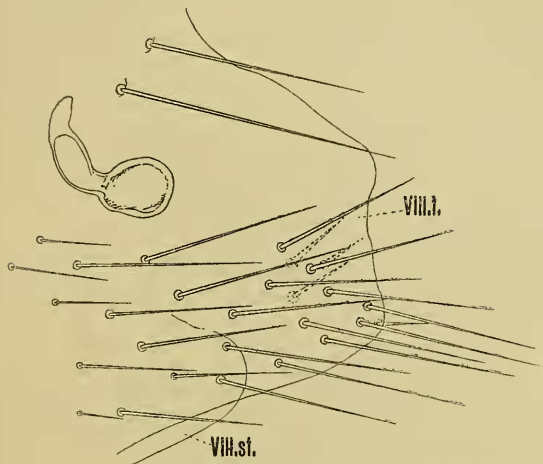
Legs.—The hind femur bears on the outside a row of 5 or 6 bristles and on the inside a row of 11 or 12. The hind tibia has 11 lateral bristles on the outside and 8 on the inside. Two of the bristles of the second hind-tarsal segment reach beyond the apex of the third. The fourth segment in all tarsi is only one-

third longer than it is broad near the apex. The measurements of the tarsi are:—

Mid tarsus : 28, 24, 20, 13, 30.

Hind tarsus : 58, 36, 26, 17, 33.

Text-fig. 111.



Abdominal segment VIII and receptaculum seminis of *Ceratophyllus crassus* ♀.

Modified segments.—♀. The seventh sternite is so much torn in both our specimens that it is not safe to express an opinion about its outline. The eighth tergite (text-fig. 111) bears two long bristles below the stigma and its apex is obliquely truncate and slightly incurved. The bristles on the lower half of the eighth tergite are numerous, and there are 3 or more short strong bristles on the inner surface. The stylet resembles that of *C. dolabris*, sp. n., but the apical bristle is appreciably shorter and thinner. The receptacle has a rounded head, which is shorter than the (artificially?) distorted tail.

Length (mounted specimens) 3.8 to 4 mm.

Two females from Old Tau-chow, Kansu, 9000 ft., off *Marmota robusta* M.-Edw.

5. CERATOPHYLLUS MANDARINUS, sp. n. (Text-figs. 112, 113.)

♂ ♀. A pale species with long rostrum, long tarsal bristles, a very long and narrow movable process in the male genitalia, and a peculiarly long-tailed receptaculum seminis with a small head in the female.

Head.—The frons is very feebly rounded in both sexes, the

frontal tubercle being placed at one-third or one-fourth the distance from the oral corner to the antennal groove. There are two long bristles in front of the eye, one of them standing near the eye and being accompanied by a much shorter bristle, and the others being placed at the oral margin. Further frontad there are two more bristles in the ♂, but not in the ♀, one of them at the oral margin behind the maxillary palpus and the other near the antennal groove. On the occiput there is one bristle above the antennal groove, and along the groove about half-a-dozen small hairs in both sexes. The apical row of bristles contains 1 long and 3 or 4 small ones, the interspace between the long (ventral) bristle and the next one being large. The third segment of the maxillary palpus is comparatively long, being only one-eighth shorter than the second segment. The rostrum reaches well beyond the trochanter, the proportional lengths of the segments being, 16, 15, 15, 27, and 40.

Thorax.—The pronotum has a comb of 18 spines (in one of the females 23) and a row of 12 bristles on the two sides together. On the mesonotum the postmedian row consists also of 12 bristles, while the row before it contains from 8 to 10. Near the base of the mesonotum there are only 14 small hairs in the ♂ and 24 in the ♀, while the inner surface bears near the apex from 9 to 12 bristle-like spines. The mesopleura bear five long bristles and anteriorly a few small hairs in addition. The numbers of bristles on the metanotum are 12 in the postmedian row in both sexes, 3 to 5 in the anterior row in the ♂ and 9 to 11 in the ♀. The metepisternum bears 2 or 3 bristles and the epimerum 5 (2, 2, 1). There is on each side one apical spine on the metanotum, as on the first to third or fourth abdominal tergites.

Abdomen.—The tergites I to VII bear in the ♀ each two rows of bristles, the postmedian row containing 13 or 14 bristles on the central segments; in the ♂ the anterior row is reduced to 4 to 6 bristles on the first to fourth segments and to one or two on segments V and VI. The seventh tergite bears on each side in the ♂ one long antepygial bristle accompanied by two minute hairs, and in the ♀ two long bristles, of which the lower one is a very little shorter than the other. The numbers of bristles on the sternites are in the ♂ 2—4 to 6—6—6—4, and in the ♀ 2—12 to 14—8—7 to 10—8—13 or 14, there being 3 or 4 small bristles in front of the row of the seventh segment on the two sides together.

Legs.—The hind femur has on the outside two lateral bristles and one subapical one and on the inside a row of 7 or 8 bristles. On the hind tibia there is one lateral row on the outside, containing in the ♂ 7 bristles and in the ♀ 5 to 8, the inner surface bearing a row of 4 to 7 in the ♂ and of 6 to 8 in the ♀. The first mid-tarsal segment is the same in length as the second. The longest bristle of the first hind-tarsal segment reaches at least to the apex of the second, and this latter segment bears two apical bristles which extend considerably beyond the

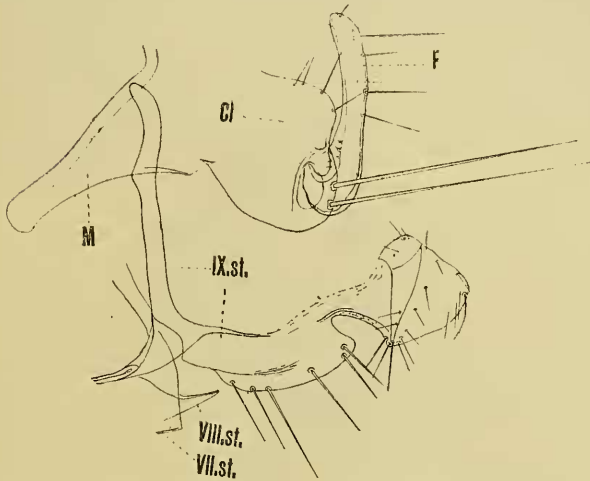
apex of the fourth. The proximal pair of bristles of the fifth segment is lateral like the other pairs. The proportional lengths of the tarsal segments are:—

Fore tarsus: ♂. 10, 12, 10, 8, 22; ♀. 12, 15, 12, 10, 24.

Mid tarsus: ♂. 18, 18, 14, 9, 22; ♀. 24, 25, 18, 10, 26.

Hind tarsus: ♂. 49, 32, 20, 12, 24; ♀. 60, 37, 23, 14, 30.

Text-fig. 112.

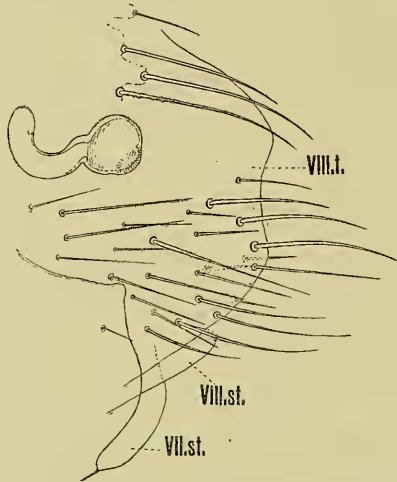


Clasping organs of *Ceratophyllus mandarinus* ♂.

Modified segments.—♂. The eighth tergite bears at the upper edge beyond the stigma a row of four long bristles, from the last bristle towards the sides of the segment there are two bristles, another stands below the stigma and two are situated near the ventral edge. The eighth sternite (text-fig. 112, VIII. st.) is small, being distally suddenly narrowed to a point in lateral aspect and bearing no bristles. The clasper (text-fig. 112, Cl) is broad, its upper angle rounded and not produced into a process. The manubrium is at first strongly narrowing from the clasper inward and then remains almost of even width; its apex is slightly curved downwards and has the upper angle more strongly rounded off than the lower angle. The movable process (F) is very long and of practically the same width throughout. It is but slightly curved and its tip rounded off. This finger bears a short bristle at the tip, a long one below the tip at the distal or ventral margin, and a third short bristle further down, then follow another short one, a moderately long one and another a little shorter than the preceding one. This last bristle is situated a short distance beyond the centre of the margin of the finger, there

being in one of the specimens another bristle lower down. The vertical arm of the ninth sternite (IX. st.) is very slender, especially the upper portion, which lies at the manubrium of the clasper. The ventral arm is divided by a ventral sinus into a longer proximal portion and a shorter and broader distal portion, the latter being about as long as it is broad. The proximal portion bears at the ventral margin 5 or 6 bristles, the two distal ones of which stand close together one on each side, and are fairly stout in comparison with their length.—♀. The seventh sternite

Text-fig. 113.



Abdominal segments VII & VIII and receptaculum seminis of
Ceratophyllus mandarinus ♀.

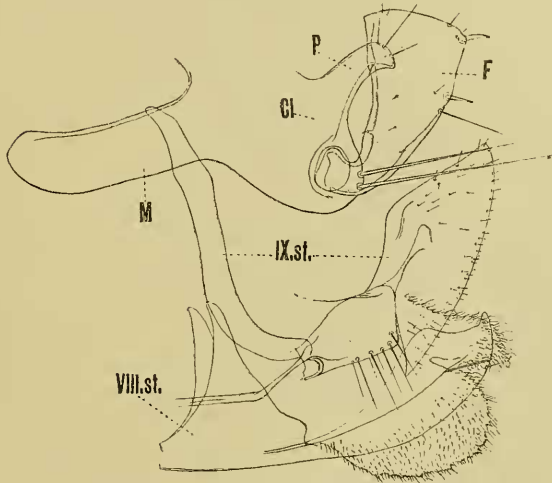
(text-fig. 113, VII, st.) narrows in side-view; its apex is truncate, somewhat obliquely, and slightly emarginate, with the upper apical angle quite distinct. The eighth tergite bears 8 to 10 small bristles above the stigma, 2 or 3 long ones beneath the stigma besides some small ones, and there are about 12 long bristles and 10 to 12 shorter ones on the lower half of the segment. The stylet is twice and one-half as long as broad. The bristles on the ninth and tenth tergites (which segments are separated by a distinct suture) are numerous. The receptaculum seminis is distinguished by the head being nearly three times as wide as the tail and only half its length. It has been disturbed in its position by the mounting in both specimens which we have, and the outline we give does not exactly represent a true lateral aspect of the organ.

Three males and two females from Yu-lin-fu, Shensi, 4000 ft., taken off *Citellus mongolicus*.

6. CERATOPHYLLUS MONGOLICUS, sp. n. (Text-fig. 114.)

♂ ♀. A single pair in the collection agrees well with *C. tesquorum* Wagn. (1893), except in the details mentioned below. The new species is smaller and paler than *C. tesquorum* and bears, on the whole, fewer bristles. The rostrum reaches a little beyond the trochanter in both sexes and is therefore longer than in the species mentioned. The abdominal sternites III to VI have each a row of 6 bristles on the two sides together, the ♀ bearing one or two additional bristles on each side of the sixth segment. The hind femur has on the outside one (♂) or two (♀) lateral bristles in the basal half and a subventral bristle before the apex, and on the inner side a row of 8 or 9 bristles. The hind tibia, which has a double row of about 11 bristles on the outer surface in *C. tesquorum*, has only 8 lateral bristles in *C. mongolicus* inclusive of the apical one. The first mid-tarsal segment is distinctly shorter than the second.

Text-fig. 114.

Clasping organs of *Ceratophyllus mongolicus* ♂.

The differences in the male genitalia are slighter than they generally are in distinct species. The non-movable process of the clasper (text-fig. 114, P) is a little slenderer than in *C. tesquorum*. The finger (F) is triangular as in that species, and bears the same bristles, but it is less widened at the apex, the upper (=apical) margin being one-fourth shorter than in *tesquorum*, the proportions of length and width of the finger being 7:4 in *mongolicus* and 7:5 in *tesquorum*. The eighth sternite of *tesquorum* is provided with 5 bristles and a thin hair, the bristles being

short but fairly thick; in the new species there are some weak hairs instead (text-fig. 114, VIII. st.).

♀. The seventh sternite of the ♀ bears on each side a row of 12 or 13 bristles and about 6 small bristles in front of the row. The apex of this sternite (in lateral aspect) is truncate, the margin being very slightly excurved centrally. The eighth tergite has a cluster of 5 or 6 bristles below the stigma and about 15 bristles at, and near, the ventral and apical margins. As in the ♀ of *C. tesquorum*, there are two long antepygial bristles on each side, not accompanied by a third stout bristle, and the bristles of the anal sternite stand far removed from the base in a dense cluster occupying the apical two-fifths of the sternite.

One pair from Yu-lin-fu, Shensi, 4000 ft., taken off *Citellus mongolicus*.

7. CERATOPHYLLUS FAMULUS, sp. n. (Text-fig. 115.)

♀. Closely resembling the preceding species, but the bristles on the body and legs are more numerous.

Head.—Frons moderately curved, slanting. The tubercle small, placed a little nearer to the central sensory organ (pale dot) than to the oral corner. In front of the well-developed eye there is a row of three bristles, the upper one being placed a little lower than the centre of the eye and the second being nearer to the upper than to the lower bristle. Between the upper bristle and the antennal groove there are several minute hairs. The occiput has above the antennal groove one long bristle and about 14 minute hairs. The subapical row of bristles of the occiput contains on each side five or six, of which the lowest is the largest, being separated from the next bristle by a wide interspace. The bristles of the second antennal segment are long, ten of them reaching the apex of the club or beyond. The rostrum extends beyond the base of the fore femur, the apex of the fourth segment being on a level with the base of the trochanter. The maxillary palpus reaches to the base of the fourth segment of the rostrum.

Thorax.—The pronotal comb consists of 20 spines. The meso- and metanotum have each two rows of bristles, the second row containing 11 or 12 and the anterior one 15, on the two sides together. The mesonotum has about six and the metanotum two or three additional bristles on the back. The mesopleura have about five long bristles and anteriorly several thin hairs. The metepimerum bears six bristles (2, 3, 1). There are two short apical spines on each side of the metanotum.

Abdomen.—The tergites have all two rows of bristles, with one or two additional bristles on the back; tergites I to IV bearing, moreover, some apical spines. The stigmata are placed above the first bristle of the posterior row, but far in front of it. The first sternite bears a pair of ventral bristles, and no lateral bristles or only one. The sternites of segments III to VI have on the two sides together a postmedian row of 8 bristles and a few additional small bristles in front of the row. The seventh segment, however,

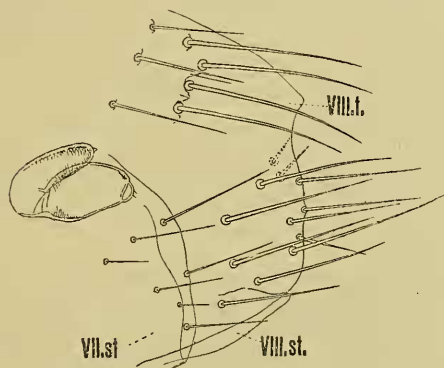
has ten long bristles in a row and no less than about 30 additional bristles, on the two sides together. There are two long antepygial bristles on a double cone.

Legs.—The fore femur has on the outer surface about 11 lateral bristles arranged in two irregular rows and on the inside a row of five lateral bristles. The mid and hind femora have outside one or two lateral bristles, and inside a row of 9 or 10 and 12 or 13 respectively. The dorsal and apical bristles of the tibiæ and the apical ones of the tarsal segments are stout. The hind tibia has 10 lateral bristles on the outside and 5 to 7 on the inside. The longest apical bristle of the mid tibia almost reaches to the apex of the second tarsal segment. The second hind-tarsal segment has two apical bristles which extend to the apex of the third segment or beyond. The fifth tarsal segment has five lateral pairs of bristles. The measurements of the tarsal segments are as follows:—

Mid tarsus : 20, 21, 14, 9, 22.

Hind tarsus : 53, 34, 21, 12, 24.

Text-fig. 115.



Abdominal segments VII & VIII and receptaculum seminis of
Ceratophyllus fumulus ♀.

Modified segments.—♀. The apical margin of the seventh sternite (text-fig. 115, VII. st.) is slanting and slightly undulating. The eighth tergite bears two rows of bristles beneath the stigma and about 16 bristles on the lower half. The apical margin of this tergite is rounded-truncate, with the upper angle distinctly produced. The ninth sternite (not drawn) bears several small bristles. The stylet, which has the shape of a champagne bottle, is twice as long as it is broad. The head of the receptaculum seminis is about as long as the tail.

Length (of mounted specimens) 2.4 to 2.6 mm.

Two females ; locality and host as in species 3 and 4.

8. CERATOPHYLLUS EUTELES, sp. n. (Text-fig. 116.)

♀. This is one of the species in which the first pair of bristles of the fifth segment of all the tarsi is shifted on to the ventral surface, being placed almost in between the second pair. The species may be recognised by the absence of bristles from the first abdominal sternite, the shortness of the bristles on the tarsi, the paucity of bristles on the femora, &c.

Head.—The frontal tubercle is placed nearer to the central sensory organ (pale dot) than to the oral angle. The eye is well developed and pigmented. There is a row of three long bristles before the eye, the uppermost bristle being a little lower than the centre of the eye. In front of this bristle there are one or two small bristles and usually a third further upwards nearer the antennal groove. The occiput bears a large bristle above the centre of the antennal groove, a small bristle further frontad and another small one further dorsad. The subapical row of bristles of the occiput consists on each side of 6 bristles, of which the ventral one is large. The interspace between this bristle and the next is twice the size of the interspace between the second and third bristles of that row. Five of the bristles of the second antennal segment are prolonged, two of them nearly reaching to the apex of the club. The rostrum extends to the apex of the coxa, its fifth segment being more than twice the length of the fourth. The maxillary palpus reaches to the apex of the fourth segment of the rostrum, the proportional lengths of its segments being 17, 15, 12, 19.

Thorax.—The pronotal comb consists of 18 spines. The meso- and metanotum bear each two rows of bristles and a few additional dorsal bristles representing a third row. The mesopleura have 8 bristles and some additional short stout hairs. The metepimerum bears 6 bristles (2, 3, 1). The metanotum has one apical spine on each side.

Abdomen.—The tergites bear each two rows of bristles as follows (the first number being that of the anterior row): 8 or 9, 9—8 to 10, 12—8 to 10, 12—7 to 9, 12 or 13—5 or 9, 12 or 13—5 or 8, 11 or 12—3 or 4, 9 or 10. The first sternite has no bristles at all. The sternites of segments III to VI have on each side three bristles, and that of segment VII bears four bristles with an additional bristle in front of the row. There are three antepygidial bristles, the middle one being twice the length of the upper and one-fifth longer than the lower.

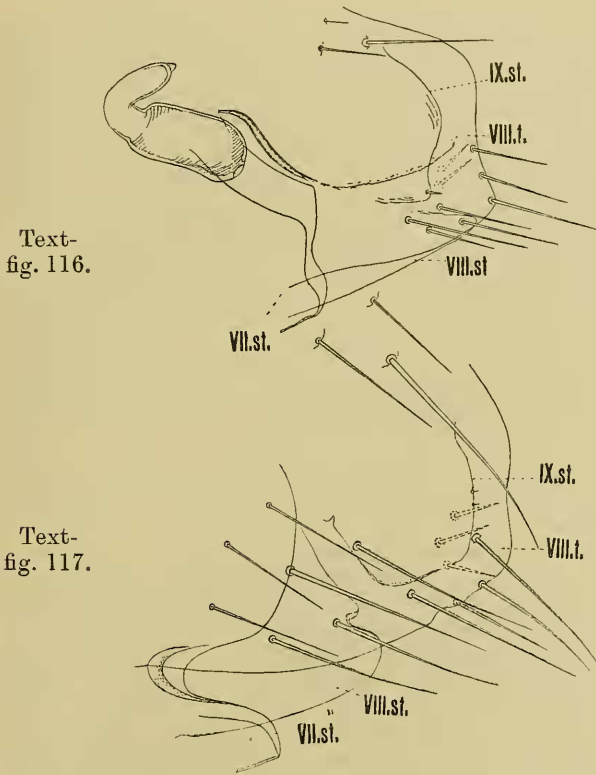
Legs.—The fore femur has two bristles on the outer surface, and one on the inner, apart from a ventral subapical bristle. The mid and hind femora have only the subapical ventral bristle on the outside, and on the inside a small lateral bristle and a small ventral subapical one. The hind tibia has a row of 8 lateral bristles on the outside and two or three bristles on the inner. The first and second hind-tarsal segments are long and slender and the bristles of the tarsi short. The longest apical bristle of the second hind-tarsal segment is one-third shorter than the third segment. The fifth segment is rather short in all the tarsi and bears

ventrally at the apex two short and fairly slender bristles, which are placed far apart. The first lateral pair of this segment stands nearly in between the second pair. The measurements of the tarsi are:—

Mid tarsus: 26, 23, 15, 9, 20.

Hind tarsus: 54, 34, 23, 13, 21.

Modified segments.—♀. The seventh sternite (text-fig. 116) rather strongly narrows apically, being truncate-sinuate in two specimens as shown in the figure, while in a third the apical margin



Text-fig. 116.—Abdominal segments VII & VIII and receptaculum seminis of *Ceratophyllus euteles* ♀.

Text-fig. 117.—Abdominal segments VII & VIII of *Ceratophyllus phaeopis*.

is more slanting and hence the ventral angle (in side view) more pointed. The eighth tergite (VIII. t.) bears one long and two short bristles below the stigma and 7 to 10 bristles in the ventral half, three of which are placed at the edge above the ventral angle.

The apical margin of this tergite is gently incurved, its upper angle being rounded, and the lower one projecting and being almost pointed. The ninth sternite (IX. st.) bears one short but rather stout bristle at its lower corner. The receptaculum seminis has an elongate head, which is longer than the tail.

Length (mounted specimens) 2.4 to 2.7 mm.

Three females from 23 miles S.E. of Ta-t sien-lu, 7500 ft., off *Sciurotamias davidianus consobrinus* M.-Edw.; Omi-shan, Sze-chuen, 9500 ft., off the same host and off *Tamiodops swinhoei* M.-Edw.

9. CERATOPHYLLUS PHLEOPIS, sp. n. (Text-fig. 117.)

♀. This species, of which we have only one female, is easily recognised by the very feebly pigmented eye, the very short bristles of the antenna, and the deeply sinuate seventh abdominal sternite.

Head.—The frons is very slanting. The frontal tubercle stands about halfway between the oral corner and the central sensory organ (pale spot), the distance from the tubercle to the oral angle being about equal to the diameter of the eye. There are three long bristles in front of the eye, the uppermost being placed near the antennal groove, the interspace between this bristle and the second being nearly twice as large as the interspace between the second and third bristles. In front of the lower bristle there is one small bristle, several minute hairs being placed in between the two other bristles. The occiput bears one bristle above the antennal groove, and a subapical row of 5 (on each side), the most ventral of them being long and strong. The bristles of the second segment of the antenna are quite minute. The rostrum reaches to the apex of the coxa, the last segment being half as long again as the fourth. The eye is feebly pigmented, excepting the anterior and posterior edges. It appears deeply excised at a certain focus.

Thorax.—The comb of the pronotum consists of 18 spines, the most ventral one of one side being very small. The meso- and metanota bear each two rows of bristles. The mesopleura have 5 or 6 bristles and the metepimerum 8 (4, 3, 1). The metanotum has also 2 apical spines on each side.

Abdomen.—The tergites bear two rows of bristles, the anterior row containing but a small number of them, the numbers in the two rows being 7 and 14 on the fourth tergite on the two sides together. The stigmata are placed dorsally to and in front of the ventral bristle of the second row. There are three antepygial bristles, the lower one being but little shorter than the central bristle, while the upper one is about one-third the length of the latter. The basal sternite has on each side a patch of four lateral bristles and ventrally one bristle. The numbers of bristles of the sternites of segments III to VII are on the two sides together (the first number giving the bristles placed in front of the row) 4, 11—3, 11—2, 8—0, 10. Tergites I and II bear an apical spine on each side.

Legs.—The hind femur bears on the outside one subapical ventral bristle and one lateral subbasal one, and on the inside a row of 5 or 6 bristles. The hind tibia has a single lateral row of 7 or 8 bristles on the outside and a row of 3 or 4 on the inside. The tarsi are slender. The second hind-tarsal segment bears an apical bristle which reaches beyond the apex of the fourth segment and another which extends beyond the apex of the third. The fifth segment bears in all the tarsi five pairs of lateral bristles. The measurements of the tarsi are:—

Mid tarsus : 29, 25, 15, 11, 24.

Hind tarsus : 58, 38, 23, 13, 27.

Modified segments.—♀. The seventh sternite (text-fig. 117, VII. st.) bears a deep sinus and is strengthened proximally to the sinus by a curved band-like incassation. The eighth tergite has three bristles below the stigma, arranged in a triangle. The bristles on the lower half of the segment are few in number. The apical margin is rounded and, above the marginal bristles, slightly incurved. The ninth sternite (IX. st.) bears a few minute hairs. The stylet is short and bottle-shaped, being twice as long as it is broad near the base. Its apical bristle is a little smaller than the most ventral one of the seventh tergite. The receptacle stands on end in our only specimen, and for that reason its shape cannot well be made out. The head appears to be round, and much shorter than the tail.

Length (of mounted and extended specimen) 3.2 mm.

One female from 23 miles S.E. of Ta-t sien-lu, 7500 ft., off *Sciurotamias davidianus consobrinus* M.-Edw.

10. AMPHIPSYLLA CASIS, sp. n. (Text-figs. 118, 119.)

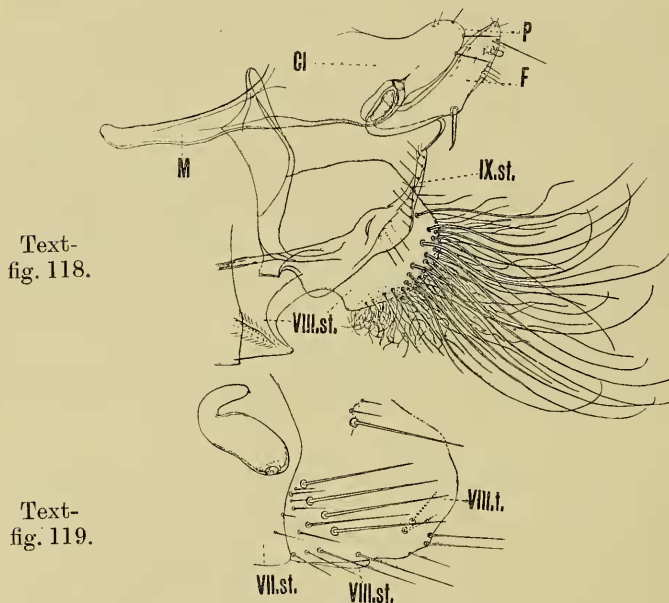
♂ ♀. The nearest ally of this species is *A. dea* Dampf (1910) from Turkestan. The detailed description which A. Dampf gave applies almost verbally to the present flea, except for the points mentioned below, and the beautiful figures published by that author of the head of the ♂ of *dea* and the last segments of the ♀ agree also equally well with the new species. As in some other instances mentioned in this paper, we suspect that we are dealing with a Chinese (or East-Asiatic) representative of *dea*.

Both sexes have, on the whole, less bristles than *A. dea*. The sternum of the metathorax bears only one long bristle, which is occasionally accompanied by a minute hair. The stigmata of the abdomen are situated between the second and third bristle of the posterior row, not above the third, on the seventh segment sometimes below the second bristle.

The epimerum of the metathorax bears 7 bristles only (2, 3, 2).

The anterior row of bristles on the first abdominal tergite contains on the two sides together about 8 bristles, and the posterior row 10, the numbers of bristles in the posterior rows on the other tergites being (also on the two sides together) 18, 17, 16, 16, 17, 16.

The bristles on the sternites II to VII number on the two sides together 2, 8, 7, 7, 8, 9, there being no short bristles in front of the row. The eighth tergite is similar to the figure given by Dampf of that segment of *A. deca*, but the bristles near the upper edge are more numerous and those on the side less numerous. The eighth sternite (text-fig. 118) is more densely hairy than in *A. deca*, the hairs at the inner side of the margin being very numerous, thin and more or less wavy, while those on the outer side are longer and thicker, the longest hairs being longer than the eighth sternite. The clasper (Cl) is less broad than in Dampf's figure and its upper margin more distinctly incurved,



Text-fig. 118.—Clasping organs of *Amphipsylla casis* ♂.

Text-fig. 119.—Abdominal segments VII & VIII and receptaculum seminis of *Amphipsylla casis* ♀.

the portion beyond the insertion of the movable process being consequently slenderer than in *A. deca*. The finger itself (F) bears the same armature as in *A. deca*, but is altogether slenderer, and at the apex distinctly narrowed, not widened as in *A. deca*. The ninth sternite (IX. st.) is not at all the same as in *A. deca*. The apical third of the horizontal arm is very narrow, its top is more strongly chitinized, and bears a short, proximally thick, terminal bristle on each side; the distribution of the fine hairs may be gathered from the figure.

The bristles of the abdomen and legs are more numerous than

in the ♂, their number coming within the limits of variation of *dava* as given by Dampf.

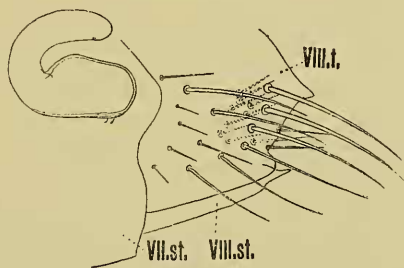
The receptaculum seminis differs from Dampf's figure of that organ of *A. dava* in having a distinctly shorter tail.

One male and two females from Yu-lin-fu, Shensi, 4000 ft., taken off *Mjospalax fontanieri*.

11. *NEOPSYLLA COMPAR*, sp. n. (Text-fig. 120.)

♀. Very similar to *N. bidentatiformis* Wagn. (1893), from which it differs chiefly in the following points:—The pronotum bears a row of 8 small bristles in front of the postmedial row of bristles on the two sides together. The seventh abdominal sternite is a little more deeply sinuate (lateral aspect) and its bristles are rather stronger. The hind coxa, which bears in *bidentatiformis* a large number of slender hairs on the inner side along the anterior edge, has a patch of short spines besides many hairs. The dorsal bristles of the hind tibia are thinner in *compar* than in *bidentatiformis*, and the hind tibia bears on the outer surface two rows of only 9 instead of 11 bristles, the rows, moreover, being separated from the ventral bristles by a wide interspace without bristles,

Text-fig. 120.



Abdominal segments VII & VIII and receptaculum seminis of
Neopsylla compar ♀.

while in *bidentatiformis* the interspace bears several additional bristles. The bristles at the hinder side of the first segment of the mid and hind tarsi are thicker than the proximal bristles of the anterior edge of the segment in Wagner's species, there being three such bristles in the mid tarsus and five in the hind tarsus, apart from the apical bristle. In the new species the bristles of these tarsal segments are practically the same on the two sides. Moreover, there are 10 or 11 bristles on the outer surface of the first hind-tarsal segment of *bidentatiformis* and only 8 or 9 in *compar*. The second mid-tarsal segment is a little shorter in *compar*, the measurements of the first and second segments being in *compar* 28 and 19, and in *bidentatiformis* 28 and 23. The eighth tergite has in *compar* on the outer surface a marginal row of 6 or

7 bristles, and near these bristles about 8 more, of which 2 are long (text-fig. 120). In *bidentatiformis* the marginal row contains 9 bristles and there are about 15 lateral ones, of which at least 4 are long. In both species is the head of the receptaculum seminis half as long again as broad, and the tail half as long again as the head. The two insects do not present any appreciable difference in this organ.

One female from Yu-lin-fu, Shensi, 4000 ft., taken off *Dignus sowerbyi*.

12. *NEOPSYLLA ALIENA*, sp. n. (Text-figs. 121, 122.)

♂ ♀. Differs from true *Neopsylla* in the hind coxa bearing a patch of short spines on the inner surface, and in the fifth segment bearing in all the tarsi five lateral bristles. Both characters are of great interest. The development of bristles into short spines on the hind coxa is met with in many genera of fleas, but not in *Ceratophyllus* proper, not in *Neopsylla*, *Ctenophthalmus*, and *Palaeopsylla*, except the two new *Neopsylla* here described. A survey of the genera which bear coxal spines renders it evident that such spines have been acquired independently in many instances and do not necessarily indicate close affinity. A species with spines may be more nearly related to one without them than to another which also bears coxal spines.

Five lateral bristles on the fifth tarsal segments are an ancestral character for fleas, the segment with more than five such bristles, or with the proximal pair shifted on to the ventral surface, or with less than five pairs being more recent modifications. The five pairs are normal for *Ceratophyllus*, while the species of *Neopsylla*, *Palaeopsylla*, *Ctenophthalmus*, and *Amphipsylla* have either five pairs in the hind tarsus with the first pair placed in between the second, or possess only four pairs. The present new species, therefore, connects that group of genera with normal *Ceratophyllus*. But the interest of the species does not end there. We find that the fifth tarsal segment of one hind leg has in both our females on one side four and on the other five bristles, while the segment has five on both sides in the other hind leg. In two of three males, both hind legs have five bristles on both sides of the fifth tarsal segment, whereas in a third male this segment has only four pairs of bristles. In all three instances where the number of bristles is reduced, it is the proximal pair, or a bristle of the proximal pair, which is absent. This appears to be decisive evidence that also in the allied species which have only four pairs of lateral bristles on the fifth hind-tarsal segment it is the first pair which has been lost.

Head.—Evenly rounded, the frontal outline vertical in the ♂, more slanting in the ♀. Eye indicated by a narrow oblique bar. Two genal spines, which cross each other as in many of the species of this relationship, the outer spine being short and broad and the lower one long and pointed. The genal lobe itself is narrower at its base than in the centre, being sole-shaped. The frontal

tubercle is small. The frons bears two rows of bristles, the anterior row containing in the ♂ 6 to 9 and in the ♀ 5 to 6 bristles, the posterior row 3 long ones, in between which there are a few minute hairs. The occiput has also two rows, an anterior one of 5 or 6 and a posterior one of 7 on each side, there being along the antennal groove a number of small hairs, in the ♂ an irregular row of about 18, and in the ♀ a patch of about 6 below the last bristle of the posterior row and two or three hairs further forward. The proportional measurements of the segments of the maxillary palpus are 12, 10, 8, 16. The maxilla is long, reaching to the apex of the third or base of the fourth segment of the rostrum. The latter is one-third to one-fourth short of the apex of the fore coxa; the fifth segment is more than twice the length of the fourth. The antennal groove is continued to the vertex in both sexes. The second segment of the antenna bears in the ♀ three bristles, which extend beyond the apex of the club.

Thorax.—The pronotum bears a comb of 16 spines and a row of 15 or 16 bristles on the two sides together. There are on the mesonotum a postmedian row of 14 long bristles, an anterior row (sometimes double laterally) of 17 to 19, and a basal row of rather long thin hairs, a few additional, short, dorsal bristles being placed in the ♂ in front of the anterior row; before the apex of the mesonotum there are 6 bristle-like spines on the underside. The sides of the mesosternite bear 9 bristles. The metatergite has a posterior row of 14 or 15 bristles, and an anterior row of 12 or 13. The metepisternum bears 3 or 4 bristles, and the metepimerum 12 to 14 (4 to 6, 5, 2 or 3).

Abdomen.—The tergites I to VII bear each two rows of bristles, the posterior row containing 18; the anterior row is reduced on the posterior segments of the ♂ to a few bristles. The stigma stands within the posterior row between the first and second bristle. The basal sternite has the usual pair of ventral bristles and on each lateral surface 2 or 3 more bristles. The sternites III to VII bear a row of 6 to 8 bristles in the ♂ and 10 in the ♀, there being also several (about 6 to 8) small bristles in front of the row. On the seventh segment the row contains 14 to 16 bristles in the ♀ and 8 in the ♂. Three antepygidial bristles, in ♂ the central one about three times the length of the others, in the ♀ not quite thrice the length of the upper one and less than twice the length of the lower one.

Legs.—The hind coxa bears a patch of about 18 spines on the inner surface. The hind femur has two subapical ventral bristles on the outside and one on the inside, there being also one small lateral bristle on the inside at the basal fourth. The outer dorsal bristles on the mid and hind tibiæ are strong and all of nearly even size, there being 10 or 11 such bristles inclusive of the apical ones, and four long dorsal bristles on the inner side of the edge. The lateral bristles are 5 or 6 in number and form one row. The bristles at the hinder side of the first mid- and hind-tarsal segments are likewise strong and not quite so long as the corresponding

bristles of the tibia, the first mid-tarsal segment bearing 4 or 5 such bristles and the hind-tarsal one 5 or 6. The bristles on the anterior side of the first tarsal segments are much less numerous. The two longest apical bristles of the hind tibia reach far beyond the apex of the first tarsal joint, the longest of this segment extends beyond the tip of the second segment, the longest of the second segment to the middle of the fourth. The proportions of the tarsal segments are:—

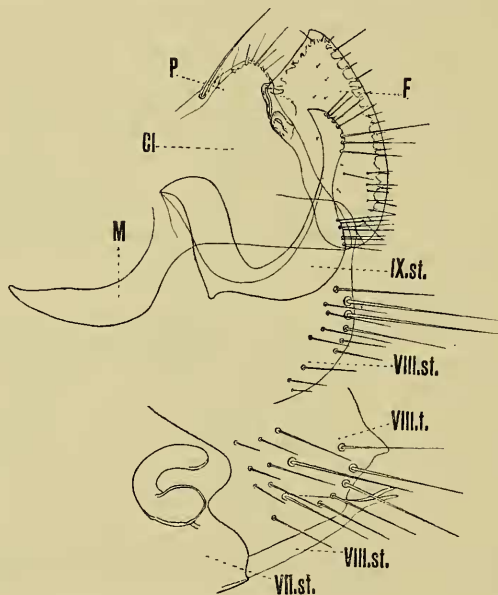
Fore tarsus: ♂. 11, 10, 10, 8, 17; ♀. 13, 12, 11, 9, 19.

Mid tarsus: ♂. 22, 18, 13, 9, 19; ♀. 23, 22, 15, 10, 21.

Hind tarsus: ♂. 33, 27, 18, 12, 19; ♀. 42, 32, 21, 13, 22.

The fifth segment has in all the tarsi five pairs of lateral bristles, occasionally the basal pair or one bristle of it being absent from the hind tarsus.

Text-
fig. 121.



Text-fig. 121.—Clasping organs of *Neopsylla aliena* ♂.

Text-fig. 122.—Abdominal segments VII & VIII and receptaculum seminis of *Neopsylla aliena* ♀.

Modified segments.—♂. The eighth sternite is broad, with the apex almost evenly rounded in side view. It bears ventrally on each side 14 to 16 bristles, of which two of the distal ones are very long. The main body of the clasper (Cl) is almost square (text-fig. 121). Its upper distal corner is rounded off and not produced into a narrow process. There are a number of small bristles at this corner, but no bristle near the insertion of the

movable process. The latter (F) is large, triangular, with the distal side rounded and longest and the upper proximal side shortest, the larger portion of the process lying from the point of insertion downwards. The distal margin of this finger bears numerous small bristles, which are nearly evenly distributed, one below the apex being noticeable by its somewhat larger size. The manubrium (M) is curved and widest in the centre, being canoe-shaped. The ninth sternite has a broad vertical arm, the proximal portion of the horizontal arm also being broad. The distal portion is at first narrow and then widens again, the apex being curved upwards and ventrally furnished with seven pairs of bristles (IX. st.).—♀. The seventh sternite (text-fig. 122) is almost gradually narrowed in lateral view and divided by a nearly central apical sinus into a rounded upper lobe and a broader and less rounded ventral lobe. The eighth tergite bears 3 or 4 bristles above the stigma and several smaller ones proximally to them. There are no bristles below the stigma, but the lower half of the segment has 6 or 7 strong bristles along the edge, and 1 to 3 large ones on the side; proximally to these lateral bristles there are about 6 to 8 smaller ones. At and near the apical edge, on the inner surface, there are two rows of bristles, 4 or 5 at the edge and 5 proximally to them. The upper apical angle of the segment is produced into a prominent point. The eighth sternite bears no bristles and ends on each side in a long slender point. The tail of the receptaculum seminis is about twice as long as the head of the same.

Three males and two females from Yu-lin-fu, Shensi, 4000 ft., taken off *Myospalax fontanieri*.

STENOPONIA, gen. nov.

♂ ♀. Similar to *Hystriehopsylla* Tasch. (1880), but differs in very essential characters as follows:—

The labial palpus consists of only one segment instead of five and does not extend much beyond the apex of the maxilla. The genal process is narrow and short, and does not reach further backwards than the uppermost spine of the genal comb. The club of the antenna is short in both sexes, being but little longer in the ♂ than in the ♀. The sensory plate of the ninth abdominal tergite is more convex than in *Hystriehopsylla*. The first pair of bristles of the fifth tarsal segment is placed in between the second pair in all the tarsi. The ♀ has only one receptaculum seminis instead of two.

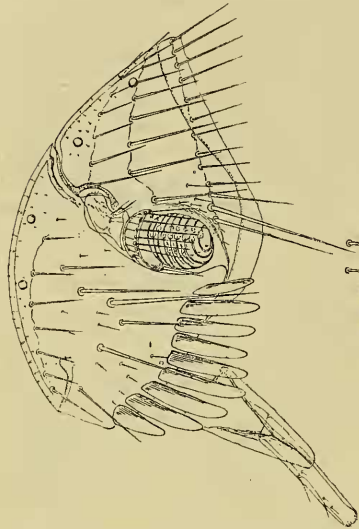
Type: *tripectinata* Tiraboschi (1902), described as *Hystriehopsylla*.

13. STENOPONIA CELESTIS, sp. n. (Text-figs. 123, 124.)

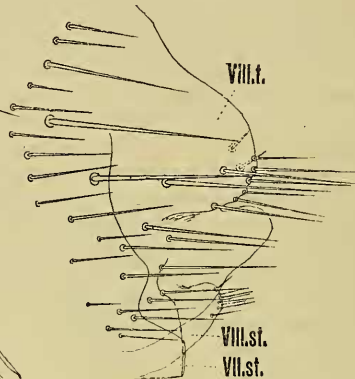
♀. Similar to *S. tripectinata* Tirab. (1902), but at once distinguished by the different shape of the head. In *tripectinata* the distance from the frontal corner to the first spine of the genal

comb is about the same as the distance from this spine to the last spine of the comb, whereas in the new species the former distance is less than half the latter.

Text-fig. 123.



Text-fig. 124.

Text-fig. 123.—Head of *Stenoponia caelestis* ♀*.Text-fig. 124.—Abdominal segments VII & VIII of *S. caelestis* ♀.

Head.—The genal process, which is visible above the last spine (text-fig. 123), is much broader than in *tripectinata*, and the rostrum is longer than in that species. The second segment of the antenna has two rows of bristles in both species. The genal comb consists of nine spines.

Thorax.—The thorax is similar to that of *tripectinata*.

The pronotal comb consists of 35 spines.

Abdomen.—The tergites have only two rows of bristles each, only segments I, II, and III having an incomplete third row, while in *tripectinata* all the tergites have 3 or 4 rows. There are 4 antepygial bristles on each side. The comb of the first tergite contains 31 spines on the two sides together.

Legs.—The bristles of the legs are shorter, especially those of the hind tarsus, and also not so thin at the tip. The longest apical bristle of the first hind-tarsal segment reaches only to the subapical notch of the second segment, and the longest bristle of the second segment scarcely extends to the apex of the third.

Modified segments.—♀. As these segments are represented by text-fig. 124, we need only point out some characters in which they differ from the segments of *tripectinata*. The lobe

* The lateral pale dot of the occiput is omitted.

below the sinus of the seventh sternite (VII. st.) is narrower in *tripectinata*, and the lobe above the sinus longer than the lower lobe, the sinus therefore being much deeper in that species. The eighth tergite is divided by an apical incision into a broad setose upper lobe and a narrower and naked lower lobe in both species. The upper lobe, however, bears more bristles in *tripectinata* both on the outer and inner surfaces, and the bristles placed further proximad on the eighth tergite are also more numerous in *tripectinata*. The eighth sternite, on the contrary, has more bristles at the apex in the new species.

Length (mounted specimen, somewhat contracted) 3.5 mm.

One female from 23 miles S.E. of Ta-t sien-lu, 7500 ft., off *Sciurotamias davidianus consobrinus* M.-Edw.

20. Contributions to the Anatomy of the Anura. By FRANK E. BEDDARD, M.A., F.R.S., F.Z.S., Prosector to the Society.

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(Text-figures 125-133.)

I. SOME NOTES UPON THE FROG *MEGALOPHRYS*
(*LEPTOBRACHIUM*) *FEÆ*.

Of this species* living examples have been recently, and are at the moment, exhibited in the Society's Gardens. The Frog was later described by Mr. G. A. Boulenger† as of the genus *Leptobrachium*, but originally‡ referred to the genus *Megalophrys*, to which all the Pelobatidæ belonging to the former genera *Megalophrys*, *Xenophrys*, and *Leptobrachium* are now§ by him referred. In dealing with certain points in the anatomy of *M. feæ*, I shall have occasion to refer to the mutual likenesses and unlikenesses between this and other species of the family to which I have already paid some attention||.

The external characters have been so fully described by Mr. Boulenger in the several papers quoted below, that little remains to be said under this heading. There is, however, one point to which I may refer. In dealing with *Xenophrys monticola* and other forms, I have described¶ and figured a glandular patch upon the thigh which is very characteristic of these Frogs. I can find no trace of this structure in *Megalophrys feæ*; and it is thus

* The specimens were, as I understand, identified by Mr. G. A. Boulenger.

† Ann. Mus. Civ. Genova, vol. vii. 1889, p. 750.

‡ *Ibid.* vol. iv. 1887, p. 512. For other references see Mr. Boulenger's paper in the P. Z. S. quoted below.

§ P. Z. S. 1908, p. 407.

|| P. Z. S. 1907, p. 324, and *ibid.* 1907, p. 871. The latter paper deals with *Megalophrys montana*, "*Xenophrys monticola*," "*Leptobrachium hasseltii*," and, incidentally, with *Megalophrys nasuta*, which is more fully described in the former paper.

¶ P. Z. S. 1907, p. 879, text-fig. 230.